CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.

41° 29′ 27.90″ North, 81° 31′ 52.22″ West, h = 326 m.

Seismographs: Two Sprengnether long-period horizontal, one Benioff vertical.
Two Sprengnether short-period horizontal.

JANUARY, 1960, BULLETIN

Date	Phase	Component	GMCT		Remarks
13	iP	z	$15^h\ 50^m\ 04.2^s$	d	USCGS: 16°S, 72°W
	ipP	z	15 50 40.4	d	H = $15^h\ 40^m\ 34^s$
	eS	E	15 57 58.2		h = 200 km ca
15	iP	zn	09 39 54.5	d	USCGS: 15°S, 75°W
	ipP	z	09 40 33.5	c	H = $09^h\ 30^m\ 24^s$
	iS	E	09 47 39.0		h = 150 km ca
16	iPKP	zne	18 57 33.9	c	USCGS: 13°S, 167.5°E
	i	e	19 04 00.8		H = $18^h\ 38^m\ 40^s$
19	iP	ze	14 28 28.5		

Seismological Observatory
John Carroll University
Cleveland, Ohio 44118 USA

FEBRUARY, 1960 BULLETIN

Date	Phase	Component	GMCT		Remarks
9	ePKP	z	$24^h\ 15^m\ 11.3^s$	d	USCGS: $4°S,\ 128°E$
	iPKP	n	24 15 13.5		$H = 23^h\ 55^m\ 49^s$
	iSKP	n	24 18 40.5		
22	iP	e	03 07 54.6		
24	iPKP	z	21 55 55.3	d	USCGS: $7.5°S,\ 156°E$
	iPP	z	21 57 12.0	c	$H = 21^h\ 37^m\ 04^s$
	ePS	E	22 06 57		
26	iP	ze	23 39 51.8	c	USCGS: $51.5°N,\ 178°W$
	eS	N	23 48 30		$H = 23^h\ 29^m\ 25^s$
27	iP	z	08 20 29.8	d	USCGS: $51.5°N,\ 178°W$
					$H = 08^h\ 10^m\ 03^s$
27	iPKP	z	09 25 04.7	d	USCGS: $6.5°S,\ 102.5°E$
					$H = 09^h\ 05^m\ 25^s$
29	iP	z	23 50 13.8	c	USCGS: $30°N,\ 9°W$
	eS	N	23 58 20		$H = 23^h\ 40^m\ 12^s$

Seismological Observatory
John Carroll University
Cleveland, Ohio 44118
USA

MARCH, 1960 BULLETIN

Phase	Component	GMCT		Remarks
eP	e	$00^h\ 16^m\ 21.6^s$		USCGS: 19°N, 101.5°W
iP	n	00 16 22.2		H = $00^h\ 10^m\ 26^s$ *
iP	z	04 17 57.3	c	
iS	e	04 26 56.9		
iP	z	16 51 53.9	d	
ipP	z	16 53 00.1	d	
iS	N	17 00 28		
isS	N	17 02 16		
iP	z	00 05 08.6	c	
iS	E	00 11 59		
iS	e	12 51 21.9		South Carolina, USA
iS_0^4	e	12 52 05.4		H = $12^h\ 47^m\ 40^s$ **
eP	z	17 20 28.5	d	USCGS: 40°N, 143.5°E
iS	E	17 30 58		H = $17^h\ 07^m\ 30^s$ *
eP	z	00 36 31	d	USCGS: 39.5°N, 143°E
iS	E	00 47 17		H = $00^h\ 23^m\ 22^s$ *
iP	z	20 21 50.5	d	USCGS: 20.0°N, 104.5°W
iS	E	20 26 57		H = $20^h\ 15^m\ 46^s$ *
eP	z	00 20 22.2	c	USCGS: 7.5°N, 82°W
iS	E	00 25 48		H = $00^h\ 13^m\ 18^s$ *
ePR_1	z	06 49 49	d	
eSKS	E	06 56 35		
iSKKS	E	06 56 57		
eP	z	20 02 14	c	
iS	E	20 07 06		

Seismological Observatory
John Carroll University
Cleveland, Ohio 44118 USA

APRIL, 1960, BULLETIN

Date	Phase	Component	GMCT		Remarks
1	iP	e	$14^h\ 18^m\ 54.3^s$		USCGS: ^{h}49°N, ^{s}129.5°W
	iP	z	14 18 54.8	d	H = $14^h\ 12^m\ 05^s$
13	eP	z	12 43 28.5	d	USCGS: ^{h}15.5°N, ^{s}92.5°W
	iP	z	12 43 32.4	d	H = $12^h\ 37^m\ 38^s$
	iPPP	z	12 44 24.4	d	
	eS	E	12 48 14.5		
15	iP	z	03 37 19.5	d	USCGS: ^{h}27°S, ^{s}113°W
	eS	E	03 46 55		H = $03^h\ 25^m\ 38^s$
15	iP	z	11 51 47.2	c	USCGS: ^{h}45.5°N, ^{s}142°E
	ipP	n	11 52 33.4		H = $11^h\ 39^m$ 01^s
	iS	e	12 02 27.2		h = 150 km ca
21	iP	zne	02 25 33.0	c	USCGS: ^{h}2.5°S, ^{s}110°W
					H = $02^h\ 16^m\ 29^s$
24	iPKP	zneNE	03 40 52.1	d	USCGS: ^{h}6°S, ^{s}113.5°E
	ipPKP	z	03 43 03.4	c	H = $03^h\ 22^m\ 23^s$
	isPKP	z	03 44 08.7	d	h = 600 km ca

Seismological Observatory
John Carroll University
Cleveland, Ohio 44118
USA

Date	Phase	Component	GMCT		Remarks
3	iP	z	$22^h\ 11^m\ 01.9^s$	d	Δ = 130 km
	iS	n	22 11 16.8		
12	iP	z	22 39 18.9	d	USCGS: 7.5°N, 81°W
	iPP	n	22 40 19.3		H = $22^h\ 32^m\ 32^s$
	iS	E	22 44 48.7		
13	iP	z	16 16 22.6	c	USCGS: 55°N, 161.5°W
	iPP	z	16 18 16.9	c	H = $16^h\ 07^m\ 12^s$
	eS	E	16 23 40.6		
14	iP	z	22 31 18.3	d	USCGS: 53.5°N, 159.5°E
	iS	n	20 40 56.4		H = $22^h\ 19^m\ 55^s$
19	ePKP	n	10 31 23		USCGS: 17°S, 66°E
	ePP	n	10 34 33.5		H = $10^h\ 11^m\ 51^s$
21	eP	z	10 14 57.8	c	USCGS: 37.5°S, 73.5°W
	iS	N	10 24 57.4		H = $10^h\ 02^m\ 50^s$
22	eP	n	10 42 44.8		USCGS: 38°S, 73.5°W
	eS	n	10 52 42.7		H = $10^h\ 30^m\ 39^s$
22	eP	n	10 44 48.9		USCGS: 37.5°S, 73°W
	eS	n	10 54 49.9		H = $10^h\ 32^m\ 43^s$
22	eP	n	12 28 54.9		USCGS: 38°S, 73°W
	eS	n	12 38 50.8		H = $12^h\ 16^m\ 43^s$
22	iP	N	19 08 08.0		USCGS: 38°S, 73.5°W
	iS	E	19 18 05.0		H = $18^h\ 55^m\ 57^s$
22	eP	E	19 22 59.5		USCGS: 38°S, 73.5°W
					H = $19^h\ 10^m\ 47^s$
22	e	e	23 37 53		
22	e	n	23 47 56.5		
23	e	n	01 58 52.5		
23	e	n	04 25 46.5		
24	iPKP	z	15 05 50.0	c	USCGS: 44.5°S, 167.5°E
	iPP	n	15 08 00.9		H = $14^h\ 46^m\ 34^s$
	iSKP	n	15 09 13.4		

MAY, 1960, BULLETIN (continued)

Date	Phase	Component	GMCT		Remarks
24	iP	z	$20^h\ 45^m\ 54.0^s$	d	USCGS: ^{h}50.5°S, ^{s}74°W H = $20^h\ 32^m\ 43^s$
25	iP	zn	08 47 17.5	c	USCGS: ^{h}45°S, 76°W H = $08^h\ 34^m\ 33^s$
	iSKS	n	08 57 34.8		
	eS	E	08 58 04.2		
26	iP	e	05 21 39.1		USCGS: ^{h}40°N, ^{s}20°E H = $05^h\ 10^m\ 05^s$
	iP	z	05 21 39.5	d	
29	iP	zn	07 51 35.8	c	USCGS: ^{h}38°S, ^{s}72.5°W H = $07^h\ 39^m\ 29^s$
	eS	E	08 01 30.8		
31	iP	zneN	11 08 21.7	c	USCGS: ^{h}18°N, ^{s}62°W H = $11^h\ 02^m\ 20^s$
	iS	N	11 13 13.7		
	iSS	n	11 14 10.9		

Seismological Observatory
John Carroll University
Cleveland, Ohio USA

Date	Phase	Component	GMCT		Remarks
2	iP	zn	$06^h\ 10^m\ 53.4^s$	d	USCGS: ^{h}46.5°S, ^{s}74°W
	iS	n	06 21 28.6		H = $05^h\ 58^m\ 03^s$
2	iP	z	08 48 30.3	d	USCGS: ^{h}40°S, 74°W
					H = $08^h\ 36^m\ 10^s$
4	iP	n	02 33 08.2		USCGS: ^{h}20°N, 104.5°W
	iP	z	02 33 10.3	c	H = $02^h\ 27^m\ 06^s$
	iS	n	02 38 03.1		
6	iP	n	01 24 22.1		USCGS: ^{h}41°N, 125°W
	iP	ze	01 24 22.6	d	H = $01^h\ 17^m\ 48^s$
	iS	N	01 29 35.1		
6	iP	n	06 08 31.8		USCGS: ^{h}45.5°S, ^{s}73.5°W
	iP	z	06 08 32.6	d	H = $05^h\ 55^m\ 44^s$
	iS	E	06 19 09.8		
11	iP	zne	00 44 58.0	d	USCGS: ^{h}21°S, 64.5°W
	ipP	n	00 46 04.9		H = $00^h\ 34^m\ 48^s$
	iS	N	00 53 09.5		h = 300 km ca
11	iPKP	z	15 33 07.7	d	USCGS: ^{h}9°S, 152.5°E
	eSKS	N	15 40 06		H = $15^h\ 14^m\ 07^s$
	ePS	E	15 44 42		
12	iP	zne	07 31 53.0	c	USCGS: ^{h}36°S, 98°W
	iS	NE	07 41 51.5		H = $07^h\ 19^m\ 43^s$
13	iP	zn	05 59 49.0	c	USCGS: ^{h}44.5°S, ^{s}76.5°W
					H = $05^h\ 47^m\ 05^s$
20	eiP	z	02 13 16.0	c	USCGS: ^{h}38°S, 73.5°W
	iP	zne	02 13 18.8	d	H = $02^h\ 01^m\ 08^s$
	iPP	z	02 16 22.5	c	
	iS	E	02 23 16.0		
20	eiP	z	13 11 54.1	c	USCGS: ^{h}39.5°S, ^{s}73°W
	iP	z	13 11 55.5	d	H = $12^h\ 59^m\ 40^s$
	iS	NE			

Seismological Observatory
John Carroll University
Cleveland 18, Ohio USA

JULY, 1960, BULLETIN

Date	Phase	Component	GMCT		Remarks
3	iP	z	$20^h\ 31^m\ 14.3^s$	d	USCGS: 55.5°N, 177°W
	iS	E			H = $20^h\ 20^m\ 46^s$
4	iP	e	04 35 28.2		USCGS: 52°N, 131.5°W
	iP	z	04 35 30.7	d	H = $04^h\ 28^m\ 33^s$
	iS	NE	04 41 01.0		
4	iP	ze	13 17 03.0	c	USCGS: 52°N, 131°W
	eS	E	13 22 47		H = $13^h\ 40^m\ 05^s$
10	ePKP	N	00 24 44.6		USCGS: 0°, 98°E
	iPP	n	00 27 37.9		H = $00^h\ 05^m\ 18^s$
	eSKP	NE	00 28 15.6		
13	iP	n	16 29 58.6		USCGS: 17°N, 94.5°W
	iP	zne	16 30 02.6	d	H = $16^h\ 23^m\ 56^s$
					h = 150 km ca
19	iP	n	16 09 25.8		Δ = 250 km
	iS	z	16 09 53.3		
25	iP	zne	03 52 13.5	d	USCGS: 55°N, 163°E
	iS	NE	04 01 14.0		H = $03^h\ 41^m\ 05^s$
25	iP	z	11 23 16.0	c	USCGS: 54°N, 159°E
	ipP	ZNE	11 23 52.0	d	H = $11^h\ 12^m\ 00^s$
	iPP	z	11 26 01.5	d	h = 100 km ca
	iS	NE	11 32 25.0		
29	iP	z	17 44 35.0	d	USCGS: 40.1°N, 142.3°E
	ePP	E	17 48 06		H = $17^h\ 31^m\ 39.5^s$
	eS	N	17 55 23		h = 50 km ca

Seismological Observatory
John Carroll University
Cleveland 18, Ohio USA

AUGUST, 1960, BULLETIN

Date	Phase	Component	GMCT		Remarks
4	iP	zne	$07^h\ 45^m\ 28.8^s$	d	USCGS: 51.4°N, 179.1°E
	epP	E	07 45 56.7		H = $07^h\ 34^m\ 53.8^s$
	eS	E	07 53 56.7		h = 83 km ca
13	iP	z	07 23 58.7	c	USCGS: 40.6°N, 142.0°E
	ipP	zne	07 24 13.5	c	H = $07^h\ 11^m\ 05.5^s$
	iS	E	07 34 43.0		h = 60 km ca
13	iP	zn	14 27 10.1	d	USCGS: 39.7°S, 74.8°W
	ipP	n	14 27 26.7		H = $14^h\ 14^m\ 57.7^s$
	iS		14 37 16.9		h = 61 km ca

Seismological Observatory
John Carroll University
Cleveland, Ohio USA 44118

SEPTEMBER, 1960, BULLETIN

Date	Phase	Component	GMCT		Remarks
1	iP	zne	$15^h\ 45^m\ 52.0^s$	c	USCGS: 56.1°N, 153.7°W
	iS	NE	15 52 43.4		H = $15^h\ 37^m\ 14.4^s$
					h = 24 km ca
2	iP	zne	22 12 46.0	d	USCGS: 52.0°N, 171.4°W
	iS	E	22 20 44.0		H = $22^h\ 02^m\ 48.9^s$
					h = 49 km ca
3	iPKP	e	12 59 33.8		USCGS: 6.1°S, 154.5°E
	iPKP	z	12 59 34.1	c	H = $12^h\ 41^m\ 34.9^s$
					h = 457 km ca
3	iP	zn	23 58 50.6	d	USCGS: 44.6°N 149.1°E
	iS	E	24 09 03.1		H = $23^h\ 46^m\ 23.9^s$
					h = 27 km ca
14	iP	e	01 58 40.5		USCGS: 19.6°N, 70.3°W
	iP	zn	01 58 40.8	d	H = $01^h\ 53^m\ 32.1^s$
	ipP	zne	01 58 54.8	c	h = 103 km ca
	iS	zneN	02 03 06.0		
17	iP	n	08 17 21.5		USCGS: 49.4°N, 155.2°E
	iP	z	08 17 22.0	c	H = $08^h\ 05^m\ 29.5^s$
					h = 28 km ca
19	iP	zn	19 08 13.7	c	USCGS: 6.9°N, 77.5°W
	iS	eE	19 13 43.9		H = $19^h\ 01^m\ 25.4^s$
					h = 66 km ca
29	i	nN	11 42 17.8		USCGS: 18.9°N, 144.7°E
					H = $11^h\ 18^m\ 52.9^s$
					h = 469 km ca
29	iP	e	19 00 17.6		USCGS: 14.9°N, 90.3°W
	ipP	e	19 00 34.1		H = $18^h\ 54^m\ 23.0^s$
	isP	e	19 00 45.4		h = 56 km ca
	iS	N	19 05 05.7		

Seismological Observatory
John Carroll University
Cleveland, Ohio 44118 USA

OCTOBER, 1960, BULLETIN

Date	Phase	Component	GMCT		Remarks
1	iP	zne	$16^h\ 20^m\ 58.0^s$	d	USCGS: 52.2°N, 172.6°W
	iS	nN	16 29 08.0		H = $16^h\ 10^m\ 56.9^s$
					h = 41 km ca
6	iP	z	20 02 34.4	c	USCGS: 58.2°N, 31.6°W
	iS	N	20 08 10.9		H = $19^h\ 55^m\ 42.2^s$
					h = 63 km ca
7	iPKP	z	15 37 52.8	c	USCGS: 7.4°S, 130.7°E
	iPP	z	15 40 09.1	c	H = $15^h\ 18^m\ 30.8^s$
	iSKP	z	15 41 15.3	c	h = 45 km ca
8	iP	zne	01 57 41.4	c	USCGS: 16.7°N, 97.9°W
	ipP	zne	01 57 51.4	d	H = $01^h\ 51^m\ 51.2^s$
	iS	e	02 02 19.4		h = 74 km ca
8	eiP	zn	06 05 20.4	c	USCGS: 40.0°N, 129.7°E
	iP	ze	06 05 21.3	d	H = $05^h\ 53^m\ 01.1^s$
	ipP	z	06 07 41.3	c	h = 608 km ca
	iSKS	ne	06 14 55.3		
9	iP	zne	09 13 28.3	d	USCGS: 40.8°N, 141.2°E
					H = $09^h\ 00^m\ 42.0^s$
					h = 155 km ca
11	iP	e	08 10 06.5		USCGS: 39.5°N, 107.5°W
	iS	NE	08 13 56.0		H = $08^h\ 05^m\ 29^s$
					h = 25 km ca
13	eiP	z	15 03 46.8	c	USCGS: 54.8°N, 161.2°E
	iP	ze	15 03 49.8	c	H = $14^h\ 52^m\ 34.7^s$
	iS	E	15 12 56.8		h = 35 km ca
14	iP	z	21 29 17.6	c	USCGS: 51.7°N, 172.1°W
	ipP	z	21 29 28.6	d	H = $21^h\ 19^m\ 11.4^s$
	iS	N	21 37 22.6		h = 50 km ca
14	iP	z	23 02 24.3	d	USCGS: 55.5°N, 35.2°W
					H = $22^h\ 55^m\ 41.7^s$
					h = 40 km ca
17	iP	zn	15 52 39.1	d	USCGS: 4.8°N, 78.4°W
	iPP	N	15 53 53.0		H = $15^h\ 45^m\ 36.9^s$
	iS	N	15 58 22.8		h = 83 km ca

Date	Phase	Component	GMCT		Remarks
28	iP	z	$04^h\ 27^m\ 04.5^s$	c	USCGS: 71.3°N, 8.6°W H = $04^h\ 18^m\ 41.9^s$ h = 48 km ca
30	iP	n	21 43 26.3		USCGS: 22.8°S, 68.0°W H = $21^h\ 32^m\ 47.7^s$ h = 60 km ca
	ipP	ne	21 43 51.9		
	iS	E	21 51 59.9		

Seismological Observatory
John Carroll University
Cleveland, Ohio 44118 USA

DECEMBER, 1960, BULLETIN

Date	Phase	Component	GMCT		Remarks
1	iP	ze	$20^h\ 56^m\ 31.7^s$	c	USCGS: ^{h}48.8°N, 129.3°W
	iS	e	21 02 00.7		H = $20^h\ 49^m\ 45.5^s$
					h = 15 km ca
2	iP	z	09 21 31.5	c	USCGS: ^{h}24.5°S, 69.9°W
	iS	N	09 30 22.3		H = $09^h\ 10^m\ 41.0^s$
					h = 37 km ca
2	iP	zn	09 48 25.8	c	USCGS: ^{h}24.3°S, 69.8°W
	ipP	zne	09 48 38.1	c	H = $09^h\ 37^m\ 38.6^s$
	iS	e	09 57 12.3		h = 64 km ca
3	iP	z	04 37 42.5	c	USCGS: ^{h}42.8°N, 104.5°E
					H = $04^h\ 24^m\ 17.5^s$
					h = 45 km ca
6	iP	zn	09 02 45.5	c	USCGS: ^{h}8.5°N, 82.7°W
					H = $08^h\ 56^m\ 16.5^s$
					h = 116 km ca
6	iP	zneN	09 06 41.5	c	USCGS: ^{h}21.4°S, 69.0°W
	ipP	z	09 06 54.5	d	H = $08^h\ 56^m\ 07.6^s$
	iS	N	09 15 09.5		h = 25 km ca
13	iP	z	07 56 06.5	c	USCGS: ^{h}52.1°S, 160.9°E
					H = $07^h\ 36^m\ 13.8^s$
					h = 29 km ca
14	iPKP	z	24 10 31.2	c	USCGS: ^{h}2.9°N, 126.5°E
					H = $23^h\ 51^m\ 28.6^s$
					h = 77 km ca
17	iPKP	zne	10 56 18.5	d	USCGS: ^{h}6.4°S, 109.3°E
	ipPKP	z	10 57 23.7	d	H = $10^h\ 37^m\ 14.1^s$
					h = 295 km ca
23	i	ne	02 02 41.5		
26	iP	zE	10 41 57.4		USCGS: ^{h}41.3°N, 124.9°W
	iS	E	10 47 18.3		H = $10^h\ 35^m\ 28.3^s$
					h = 30 km ca

Seismological Observatory
John Carroll University
Cleveland, Ohio 44118 USA